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NOTES AND LITERATURE

MAMMALOGY

Nelson's Monograph of the North American Leporidæ.—Mammalogists owe a debt of gratitude to Mr. E. W. Nelson for his recent monographic revision of the hares and rabbits of North America,[1] the first revision of the group as a whole since the publication of Allen's monograph of this group in 1877. Mr. Nelson, in addition to abundant material, has brought to his task an intimate knowledge of these animals in life, and of the environments to which the different groups of species are subjected, through his many years' experience as an explorer and collector, covering a wide area, embracing Arctic Alaska, the arid southwestern United States, Lower California, and the whole of Mexico, including the tropical coast lands as well as the plateau region. The monograph is based on the careful study of nearly 6,000 specimens, all of the material contained in the principal museums of America having been examined. The number of species and subspecies recognized is 97, of which 93 are contained in the collections of the United States National Museum. This is an increase of nearly 80 over the number known in 1877.

The introduction (pp. 9–61) deals with the economic relations of the American rabbits to agriculture; the use of the names rabbit and hare; the condition of the young at birth; the distribution of the genera and species; their habits and diseases; their color patterns, molts and seasonal changes of color; sexual, individual and geographic variation; their classification, and keys to the species and subspecies.

Points of general interest are the destructiveness of these animals to vegetation, through injury to young trees, both in orchards and newly planted forests; and their food value, which, as is well known, is considerable, millions of rabbits being sold in our markets each winter.

The names hare and rabbit were originally used in a specific sense to designate the two long-known European species; later their use became greatly broadened and their application more or less interchangeable, with different restrictions by different authorities and in different countries. Mr. Nelson would confine the use of the term hare, so far as American species are concerned, to the restricted genus Lepus (including the varying and Arctic hares and the jack rabbits), and employ the term rabbit for the "cotton-tails" or smaller brush rabbits and swamp rabbits (genus Sylvilagus and allied forms). The hares are, generally speaking, larger than the rabbits, live mostly in "forms," and bring forth young with open eyes and well-clothed with hair; many of the rabbits are known to bring forth their young naked and blind; while some of them burrow, others live in forms, like the true hares.

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[1] "The Rabbits of North America," by E. W. Nelson, chief field naturalist, Biological Survey. Prepared under the direction of Dr. C. Hart Merriam, Chief of Bureau of Biological Survey. North American Fauna, No. 29, August 31, 1909. 8vo, pp. 1–314, pl. i–xiii, and 19 text figures.

Formerly all the species of Leporidæ were referred to the single genus Lepus, but later, mainly within the last decade, several genera have been recognized by the leading authorities on the group, together with a number of subgenera. Mr. Nelson arranges the North American species in four genera—Lepus, Sylvilagus, Brachylagus and Romerolagus. The last two are monotypic with very restricted ranges; the rest of the species are assigned to Lepus (with two subgenera, Lepus = Arctic and varying hares, and Macrotolagus = "jack rabbits") and Sylvilagus (also with two subgenera, Sylvilagus = "cotton-tails" or brush rabbits) and Tapeti (swamp rabbits. The latter includes most of the species of Central and South America).

The hares of the subgenus Lepus (the Arctic and varying hares) have a double molt, being brown in summer and white in winter, while the other species are believed to molt, for the most part at least, only once (in fall), and the only seasonal change of color is due to the fading and abrasion of the long-worn coat. Formerly it was supposed that the white winter coat of all the northern hares was due to a change of color in the hair itself of the summer coat. On this point Mr. Nelson says:

> The change in color from the white winter pelage of northern species to the dark summer coat, or *vice versa,* is accomplished so gradually that at certain stages it appears like a change in the color of the hairs instead of a molt, as was definitely proved by Doctor Allen in his paper on the changes of pelage of the varying hare.[2]

This supposed change of color in the hairs, he further says,

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[2] *Bull. Am. Mus. Nat. Hist.,* VI, pp. 107–128, May 7, 1894.

''may be readily disproved by a careful examination of a few molting specimens.'' It is also now well known that the white winter coat of the ermines and weasels, and of such species of lemmings as turn white in winter, is due to molt and not to a blanching of the hairs of the summer coat. In other words, seasonal change of color in mammals, as well as in birds, is due entirely to molt. In the case of the hares and weasels, the change to white in winter is only partial at the southern border of the ranges of species that further north become wholly white in winter, while the most northern forms of the Arctic hare group remain practically white in summer, as in northern Greenland and northern Ellesmere Land. The time of molt also varies with the character of the season. As has long been known, an early spring or fall brings on the molt a month or more earlier than a later one, and hence a change of color in such species as have a white winter livery is correspondingly later.

Mr. Nelson confirms the statements of previous writers that the pelage in mammals is in other ways subject to modification by the environment, as through variation in its length and density in accordance with the severity of the climate. In discussing the effect of environment, he also confirms the experience of other mammalogists, and of ornithologists and herpetologists as well, that ''like climatic conditions often produce the same or closely similar colors in dissimilar species,'' and also parallel modifications in other features, including cranial details of structure.

> These fluctuations are somewhat wavelike in character and rise to central points of extreme development and then sink away to intermediate borders beyond which new waves arise. When the waves of differentiation are pronounced they mark recognizable geographic races. . . . In the case of wide-ranging subspecies such fluctuations are frequent, especially where the areas occupied are diversified by mountains. These fluctuations, which are sometimes extremely local, mark, of course, potential subspecies. Some are fairly well characterized and eventually may be named, while others are too slight to be formally recognized by name, but well serve to illustrate the plastic condition of the species. The transition from one subspecies to another takes place abruptly or gradually in exact accord with the changes of environment which produce them. . . .

As is well known, many mammals are subject to periodic destruction by disease. This is especially marked among rodents, such as voles, ground-squirrels and rabbits, and their reduction or increase in numbers, as the case may be, powerfully affects the welfare of such species of mammals and birds as prey upon them. In the case of rabbits, destruction by epidemics is periodical, occurring apparently about once in seven years, although exact data are wanting as to the regularity or frequency of these epidemics, or their exact nature. They are at times so severe that only a few individuals are left to perpetuate the species. They are also followed, there is some reason to believe, by an increased birthrate by which the stock is rapidly replenished. This periodic destruction is considered by Mr. Nelson in relation to the apparent opportunity thus afforded for the origination, through isolation, of many strongly characterized forms, but he fails to find evidence that this is an evolutionary force of much importance. The *Lepus americanus* group, occupying the vast wooded area from Nova Scotia to western Alaska, which has been subjected to numberless recurring periods of extreme abundance and extreme scarcity, presents only a few, and not strongly, differentiated subspecies, owing, it is believed, to the leveling influence of similarity of climate.

In illustration, however, of the effects of complete isolation under similar climatic conditions, the black jack rabbit of the island of Espiritu Santo is cited. This small island lies off La Paz Bay, Lower California, only four miles from the mainland, from which it is separated by a channel having in its shallower parts only four to five fathoms of water. The island was doubtless formerly a part of the mainland, and has still the same character of vegetation and climate. The adjacent mainland is occupied by a pale form of the *Lepus californicus* group, the island by a form essentially the same in size and cranial characters, but so dark in color as to be commonly referred to as the ''black'' jack rabbit. The intensification of color, making it ''extraordinarily conspicuous,'' has not been ''protective,'' nor yet has it proved a detriment, presumably from the fact that no predatory mammal or large bird of prey shares its habitat.

Coming now to the systematic portion of the monograph, it may be noted that the genera and subgenera here recognized are very satisfactorily characterized, and the keys to the species and subspecies are carefully elaborated, occupying ten pages for the 97 forms recognized. These, in the systematic part of the monograph, are treated very fully in respect to their distinctive characters, ranges and relationships. There is, however, very little on the historical side of the subject beyond a briefly annotated bibliography of sixty-six titles (pp. 282–287), prefaced by a page and a half of historical résumé. The citations under the species relate almost wholly to synonyms, which in this group of American mammals are fortunately exceptionally few. There is little to indicate the point of view of previous writers, or their manner of treatment as regards forms recognized and their allocation. The correlation, from the author's standpoint, of work previously done is an essential feature of a monographic treatise; and this can be fairly shown in tables of reference,[3] with such slight additional comment as may seem necessary. This defect in the present case is doubtless a feature of environment, due to limitations already referred to in another connection.[4] Yet it seems strange to find no reference under the genus Romerolagus to the discussion of the structure and affinities of this interesting type by previous authors, as Lyon, Major and Herrara, nor to the alleged earlier competitive name for the species, namely *Lepus diazi* Ferrari Perez (1893).

As already intimated, the systematic treatment is in general excellent. The species is first considered as a whole; its subspecific components are passed in review, their ranges shown graphically on a map, and a table gives the average measurements, external and cranial, of five specimens of each form, the same external measurements being repeated later in their proper connection in the text. This number, however, is too few to be satisfactory, and extremes of variation are not indicated. Under the subspecies the geographic range is first indicated, followed by a paragraph of "general characters," and very full descriptions of the coloration, seasonal variations, cranial distinctions, and such "remarks" as circumstances may require. In view of the material studied by the author, and his standing as an investigator, criticism of details would be out of place unless based on equal opportunities. Mr. Nelson, however, has given a decidedly new aspect to the nomenclature of the group, through the revival of certain previously unidentified names, the merging of the *texianus* group of former authors with the *californicus* group, of the *arizonæ* group with the *audu-*

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[3] Note, for example, the synonymies in Ridgway's "Birds of North and Middle America."

[4] American Naturalist, Vol. XLIII, October, 1909, p. 639.

boni group, the reduction to subspecies of numerous forms previously recognized as species, and the raising to specific rank of forms formerly treated as subspecies.

The only new form appears to be a subspecies *littoralis* of *Lepus aquaticus* Bachman, through the assignment of a type locality for *aquaticus*. As Mr. Nelson says, there "was no definite type," and the species was described "from specimens obtained in western Alabama by Dr. J. M. Lee. . . . No definite type locality is mentioned, but the context appears to indicate that these specimens came from western Alabama, which may be considered the type region." He further states that "the types do not appear to have been preserved," and were thus unavailable as an aid in settling the type locality. In the original account of this species Dr. Bachman said that he did not know of its existence "to the east or north of the State of Alabama," but that "it is numerous in all the swamps of the western parts of that state, is still more abundant in the State of Mississippi and the *lower parts*[5] of Louisiana, and is frequently brought by the Indians to the market of New Orleans." If Mr. Nelson had been the first to split the *Lepus aquaticus* group into a Gulf coast form and an interior form his course would be justifiable, but this division was made long before, when the *Lepus aquaticus attwateri* was separated on the basis of comparison of specimens from the vicinity of San Antonio, Texas, with a series from the vicinity of New Orleans. He recognizes only the same two forms, so that his *littoralis* is properly a synonym of *Lepus aquaticus aquaticus*, with the name of the interior form still *Lepus aquaticus attwateri*. Were it conclusively known that the type locality of *aquaticus* was within the range of the interior form, he would be fully justified in his present ruling, but in view of the fact that it is at best conjectural, and that the same division of the species he now makes had been made before, thus in effect restricting the name *aquaticus* to the Gulf coast form, his action in the case seems at least open to reasonable objection.

The illustrations comprise twelve excellent plates (from photographs) of skulls of the different leading types of North American hares and rabbits, a plate (from a wash drawing) of "directive coloration in *Lepus callotis*," and nineteen text figures, sixteen of which are distribution maps, and three illustrate osteological characters in the genera Lepus and Sylvilagus.

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[5] Not italicized in the original.

The ''directive coloration'' plate shows two specimens of a Mexican species of jack rabbit, which has white sides and a dark buffy mantle covering the back. One figure shows the mantle in its usual position, the other with the mantle ''shifted to the opposite side and the whitish area of the side drawn up nearly or quite to the dorsal line,'' the animal being then in the act of ''signalling.'' This extraordinary feat is described at length on page 115, where it is said that ''By means of muscles the skin of either side can be drawn over the back at will.'' Mr. Nelson further states that on one occasion one of these rabbits observed by him kept the ''white area in the same position until it had traveled 50 or 60 yards, when the colors slowly resumed their normal positions.''

Despite the slight criticisms we have felt called upon to make, Mr. Nelson's ''The Rabbits of North America'' marks an era in the history of the group, and is so comprehensive and so well done that it must long remain the basis for future work, to be corrected doubtless in many minor details as new material is received, but nevertheless a boon to all workers in North American mammalogy.

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NEUROLOGY

Edinger's ''Vorlesungen über den Bau der nervösen Centralorgane'' made its first appearance as a small volume in 1885. Its directness and lucidity gained for it at once a deserved popularity and a growing demand justified the numerous editions under which it subsequently appeared. In its latest form, the seventh edition, the work consists of two volumes, either of which is about twice the size of the original edition. This considerable expansion has taken the work away from the circle of readers, mostly medical students and physicians, for whom the earlier editions were intended. It is therefore natural that an effort should be made to return to the earlier form and this effort has found its realization in the present ''Introduction.''[1] This volume, which contains a little less than two hundred pages, is a

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[1] Edinger, L., ''Einführung in die Lehre vom Bau und den Verrichtungen des Nervenssystems.'' Leipzig, F. C. W. Vogel, 190 pp., 161 figures, 1 plate, 1909.